Interdisciplinary professional education

Training college students for collaborative social change

Monica Nandan

*Department of Social Work and Human Service, Kennesaw State University,
Kennesaw, Georgia, USA, and*

Manuel London

*College of Business, Stony Brook University, Stony Brook,
New York, USA*

Abstract

Purpose – The purpose of this paper is to provide a rationale for developing interprofessional competencies among graduates from professional and graduate programs, so that they are well prepared to participate in local, national and global social change strategies.

Design/methodology/approach – After reviewing the literature on strategic social change initiatives the authors briefly describe two such initiatives: corporate social responsibility initiatives and social entrepreneurial ventures. After reviewing the interprofessional literature from various disciplines and professions, the authors categorized them into "competencies," "rationale," "conceptual framework," "principles" and "challenges." An examination of exemplar pedagogy from this body of literature suggests ways to prepare students to lead and actively participate in innovative, collaborative social change initiatives.

Findings – Interdisciplinary competencies include teamwork, communication, contextual understanding, negotiation, critical thinking, leadership, openness and adaptability. Interprofessional educational models are difficult to implement, however, ethical responsibility of educators to prepare students for complex realities trumps the challenges.

Practical implications – Interprofessional educational experiences can enable students to engage in generative and transformational learning which can later facilitate in creation of innovative solutions for society's recalcitrant physical, social and environmental issues.

Originality/value – Based on the system's perspective, the paper provides guidelines and strategies for implementing interprofessional pedagogical initiative.

Keywords Community partnerships, Competencies, Interdisciplinary and interprofessional education

Paper type Conceptual paper

Introduction

Today's global economy and information age have propelled complex and dynamic challenges for nations and communities. These challenges call for collaboration and complex solutions often demonstrated in cross-sector alliances and partnerships (Lawson, 2010). Mason and Mitroff (1981) designated these as "wicked problems" because they accentuate uncertainty, complexity, ambiguity and interdependence (Lawson, 2010, p. 16):

> Worldwide leaders in […] are struggling to find complex interventions and theories of change suitable for the formidable challenges they confront. Chief among these challenges is the ability to meet multiple needs and solve complex problems simultaneously [in a sustainable fashion]. Linear, one-at-a-time problem solving, characteristic of industrial age school and human service organizations, simply cannot keep pace (Lawson, 2010, p. 8).

College graduates should be prepared with skills and competencies to contribute to, and solve, turbulent and seemingly intractable problems utilizing interdisciplinary perspectives. Interdisciplinary/interprofessional[1] thinkers bring expertise from their primary discipline and work with experts from other disciplines to tackle complex problems. Responsibilities for imparting interprofessional competencies should be particularly on the shoulders of all professional education programs at undergraduate and graduate levels (Weld and Trainer, 2007). Today, universities are expected to produce new knowledge and teach in a fashion that is contextually relevant for addressing society's problems extending beyond a single discipline (National Academy of Science *et al.*, 2004). Public universities, especially, are responsible for remaining engaged in their communities, and also for promoting economic justice, democracy and sustainable impact through innovative approaches (Lawson, 2010). Interdisciplinary educational models and programs facilitate holistic understanding of complex situations, humans, contexts and issues (Holley, 2009). Consequently, a surge in interdisciplinary studies has occurred, though, mostly in undergraduate programs (Jacobs and Frickel, 2009).

The thesis of this paper is that global social change initiatives require a skills set and competencies that can best be imparted through interprofessional educational models. We briefly describe some strategic partnership – social change – initiatives that arise from corporate social responsibility (CSR) and social entrepreneurship (SE). We then explicate the competencies required to create such change, offer a critical review of the literature on interdisciplinary professional education, and propose a graduate level interprofessional pedagogical configuration – based on systems thinking – that can fits well within the existing curricula and promotes generative and transformational learning among students from different disciples and professional programs.

Strategic partnerships for social change

Global and community-based challenges are being addressed through novel cross-sector partnerships, emerging demand for CSR and mushrooming social entrepreneurial ventures (Eddy, 2010; Siegel, 2010). These strategies often result in product and process innovations that can create sustainable social, economic and environmental changes. In other words, innovations can create lasting impact as new capacities are developed in people, organizations and in communities at large (Lawson, 2010). Impact takes time to effect and requires collaborative and interprofessional effort.

CSR is "[…] a commitment to improve community well-being through discretionary business practices and contribution of corporate resources" (Kotler and Lee, 2005, p. 3). CSR is a focused response by an organization to social and environmental issues that are created through its operations (Heal, 2008). By going beyond fulfilling an obligation, corporations are shifting their CSR initiatives to being strategic through long-term commitments to specific social and environmental issues, sometimes issues they created or increased. Illustrations of CSR initiatives include, but are not limited to, innovation and commercialization for health promotion and environment protection, corporate social marketing, cause-related marketing, corporate philanthropy, community volunteering and socially responsible business practices (Kotler and Lee, 2005, p. 46). According to Carly Fiorina, Hewlett Packard's former CEO, "[…] cutting-edge innovations and competitive advantage can result from weaving social and environmental consideration into business strategy from the beginning" (cf. Kotler and Lee, 2005, p. 1).

Organizations in for-profit and nonprofit sectors have benefited from cross-sector partnerships or alliances. Examples of such partnerships include KaBOOM!, the American Library Association, Save the Children, City Year, Share Our Strength, Newton-Conover Public Schools and Pioneer Human Services. Similarly, several corporations have benefited by partnering with nonprofit organizations, such as, Home Depot, Microsoft, Denny's BankBoston, Calphalon, Ridgeview and Boeing, to name a few (Sagawa and Segal, 2000).

SE existed long before William Drayton first coined the term over 30 years ago (e.g. Susan B. Anthony, Jane Addams and Dorothea Dix as pioneers in social work) (Davis, 2002; Dacin *et al.*, 2010). Social entrepreneurs develop solutions that are novel and unprecedented (Vega and Kidwell, 2007). Social entrepreneurs, often characterized as social change agents, engage in changing institutions and systems (Hsu, 2005; Kington, 1995). Today, names that resonate with social entrepreneurs include Bill Drayton, founder of Ashoka, Pamela Hartigan, managing director of the Schwab Foundation, Alan Khazei, co-founder of City Year, a leading national service organization and Ela Bhatt, the founder of the Self-Employed Women's Association in India. Other well-known social reformers are in medicine and education across the globe (Pomerantz, 2003, cf. Harding, 2007).

Dees *et al.* (2001) defined social entrepreneurs as "innovative, opportunity-oriented, resourceful, value-creating change agents" (p. 4). Gray *et al.* (2003) described social entrepreneurs as innovators who balance an organization's economic and social goals and who value local participation and partnerships in decision making to promote social justice. David Bornstein described social entrepreneurs as transformative forces in society who possess new ideas to address deep-rooted social problems as well as the energy to pursue their vision (cited in *The Economist*, 2006).

CSR, cross-sector alliances and SE initiatives illuminate a "non-dichotomous, integrated knowledge framework and action system" (Lawson, 2010, p. 16). These initiatives involve integration across systems. Individuals who lead and participate in such initiatives require special skills and competencies. How responsive are the institutions of higher learning, when progressively, college graduates are being called upon to solve society's complex problems that demand integrating knowledge and experiences from varied fields and professions in order to address multidimensional and multifaceted issues (Holley, 2009)?

Competencies for creating social change
A dynamic and complex world requires a unique skill set among leaders and team members who are social change agents (Klein and Newell, 1997). These leaders and team players are innovative and multidimensional in their approaches, utilizing critical thinking and problem-solving skills for addressing complex issues and creating lasting impact. More specifically, cross-sector partnerships, CSR projects and social entrepreneurial ventures require skills such as collaboration, integration and ability to make connections between disparate bodies of knowledge, negotiation, compromise and persuasiveness (Cronon, 1998; Shor, 2010). Collaboration skills, especially, are significant for professional training and can be practiced in interdisciplinary/ interprofessional teams (Interprofessional Education Collaborative Expert Panel, 2011).

Stark and Lattuca (1997) and Stark and Lowther (1989) touted the necessity of communication competence, critical thinking, contextual competence (i.e. understanding the context in which the profession is being practice and the interdependent nature

of profession and context), leadership and adaptive competence (i.e. promoting change) for interprofessional endeavors. Wieseman and Moscovici (2003) identified the courage to initiate new approaches, willingness to listen to different perspective, desire to negotiate and ability to be supportive and respectful of difference of opinions, as essential characteristics for interprofessional practice. Further, group work and group process skills along with conflict resolution lend themselves to effective interprofessional team practice (Young *et al.*, 2011). Interdisciplinary team-based education and training can be instrumental for developing and practicing the aforementioned list of interprofessional/ interdisciplinary competencies (Holley, 2009). To understand how development of these competencies can be embedded in curricula, we review the literature on interdisciplinary education and practice.

Interdisciplinary education and practice
We reviewed articles published over the past 11 years (2000-2011) on interdisciplinary and interprofessional education and practice models from several citation indexes (e.g. Social Science Citation Index, ERIC, Medline, Ageline and Business citation indexes). To a large extent, the term interdisciplinary education is used by undergraduate programs in higher education (Holley, 2009); and, most literature on interprofessional education is in the fields of teacher education and health care (e.g. Jacobsen *et al.*, 2009). Interdisciplinary education models have been implemented in several graduate and undergraduate programs such as social work (e.g. Doris *et al.*, 2009; Lennon-Dearing *et al.*, 2008), psychology (e.g. Applegate *et al.*, 2009), gerontology (e.g. Burbank *et al.*, 2002; Clark, 2002; Howard *et al.*, 2009), environmental sciences (e.g. Focht and Abramson, 2009), health sciences (e.g. Brown, 2009; Dillon *et al.*, 2009), teacher education (e.g. Bubenzer and Westphal-Johnson, 2012; George and Oriel, 2009; Holtzman *et al.*, 2012). The themes that emerge from the literature can be grouped into the following categories: rationale, conceptual framework, generative and transformative learning, challenges surrounding implementation of interprofessional educational and practice models and illustrations of educational models.

Rationale
Generally, the literature recognizes that the complexity of social problems in today's dynamic context requires integrating knowledge from across disciplines and professions (Holley, 2009; Yang and Hsiao 2009). Accountability, applicability and sustainability of solutions for addressing complex issues have triggered great interest in interdisciplinary education at all postsecondary education levels (Koch *et al.*, 2009; Holtzman *et al.*, 2012). However, interdisciplinary professional education is not necessarily embedded within the culture of higher education institutions. Most professionals work at the intersection of their disciplines and often work with heterogeneous groups of people (Applegate *et al.*, 2009; Brown, 2009). Furthermore, today's careers are protean and boundaryless, meaning that professionals need to be continuous learners, and they will, most likely, change careers – and certainly jobs – multiple times throughout their lives (Hall, 2002; London, 2012). Consequently, they need to be more flexible, have the ability to integrate and synthesize the knowledge they have acquired from different sources, and possess the ability "to contribute to diverse and dynamic teams" displayed in most interdisciplinary work settings (Holley, 2009, p. 105).

Interdisciplinary teams are normally created once students graduate – in their work world – and generally not in academic settings (DiLisi *et al.*, 2006).

Schneidar (1997; also see, Smith and Morgaine, 2004) argues that interprofessional practice is an advance competency that has to be taught in a structured systematic fashion and does not develop automatically among graduates, even though, in the work world, many professionals are utilizing these skills to fulfill their jobs.

Most professionals (e.g. social work, accountants, engineers, economists, nurses, physicians, lawyers and teachers) regularly work with individuals from different professional fields. The complexity of issues they address necessitates cooperation and collaboration with diverse professionals. For instance, Gautam N. Yadama, Associate Professor of Social Work and Director of International Programs at the George Warren Brown School of Social Work at Washington University, St Louis, works with an interdisciplinary team of engineers, medical professionals and community residents to find creative ways to implement clean-air solutions in communities of marginalized populations in India, Nepal and China (Yadama, 2013). Such cooperation and collaboration can normally ensure un-fragmented solutions (Holtzman *et al.*, 2012). Consequently, it is incumbent that graduates of professional programs are educated and socialized into interdisciplinary and interprofessional environments (Bruder, 2000):

> Interdisciplinarity is a "process by which professionals reflect on and develop ways of practicing that provides an integrated and cohesive answer to the needs of the client/family population […] [I]t involves continuous interaction and knowledge sharing between professionals, organized to solve or explore a variety of education and care issues all while seeking to optimize patient participation […]. Interprofessionality requires a paradigm shift, since interprofessional practice has unique characteristics in terms of values, code of conduct, and ways of knowing" (D'Amour and Oandasan, 2005, p. 9).

Interdisciplinarity appears to be synonymous with innovation, creativity and reform (cf. Holley, 2009). Both process and product innovations occur through inter-organizational and interpersonal collaborations (Lawson, 2004). Pecukonis *et al.* (2008) present an extensive body of literature on the benefits of interdisciplinary practice in a wide range of settings. However, the structure of most higher education institutions that purport super specializations, hinder cross-disciplinary synthesis often required by college graduates to tackle intractable issues (Weld and Trainer, 2007). Traditionally, universities have offered educational programs in "disciplinary silos and [with] reductionistic approaches" (Mulvihill, 2010, p. 47). This unnecessarily creates "cognitive and social boundaries between professions that hinders" collaboration and reduces potential for innovation (Jacobsen *et al.*, 2009, p. 30). College graduates may be left to find or stumble across their own synthesis. Further, Jacobsen *et al.* (2009) and Smith and Morgaine (2004) note that the atomization of curriculum – which often results in fragmented and compartmentalized learning among students – is not reflective of the dynamism and complexity of real-life circumstances. Instructions in professional programs will "need to develop approaches that counteract those aspects of today's higher education culture that encourage students to perceive classes as distinct and individual rather than to make connections among the ideas they are learning" (Smith and Morgaine, 2004, p. 271). Therefore, college education should not be limited to specializations, but should prepare graduates for a wide range of professional responsibilities where they interact, and strategize, with heterogeneous groups of people (Case, 1994); these institutions should instill interprofessional competencies among their graduates (George and Oriel, 2009).

The term interprofessional education has been used mostly by healthcare professional programs, and the term interdisciplinary educational models have been

employed by traditional disciplines (e.g. gerontology, sociology, economics, management and psychology) and sometimes by professional programs (e.g. social work). Professional schools and programs such as education, social work, medicine, nursing, accounting, public administration and law are by their very nature interdisciplinary, and offer vital resources for understanding complex topics from an interdisciplinary perspective (Lawson, 2010). Through collaborative teaching among these programs, and interprofessional educational models, professional programs can provide opportunities for students to expand their conceptual boundaries for understanding diverse perspectives required for addressing real-world contextual issues (Belenky *et al.*, 1986; Wieseman and Moscovici, 2003). An interdisciplinary educational model can provide students the "opportunity to learn and collaborate as an interdisciplinary team," which in turn can enhance the quality of the product/service produced by such a team (Applegate *et al.*, 2009, p. 479). Modifying disciplinary and professional boundaries of educational programs within institutions of higher learning to "more closely align with the dynamic state of knowledge outside the academy, enables the institution to prove a unique educational opportunity for students" (Holley, 2009, p. 99). Organizational transformation and culture change may be needed within institutions of higher learning to build true interdisciplinary and interprofessional educational models (Holley, 2009).

"Interdisciplinary curriculum can be described as a continuum of possibilities ranging from a more discipline-based focus to a more holistic focus on an idea, issue or a learner's question" (Wieseman and Moscovici, 2003, p. 128). Basically, in a holistic focus within a curriculum, knowledge, skills, theories and methodologies are applied and integrated from several disciplines and professions to examine an issue and design interventions (Jacobs, 1989). On the other end of the continuum, interdisciplinary teams and educational models may be limited to informal communication between partnering professionals and faculty from different disciplines (Shor, 2010). Lattuca (2001) and Aram (2004) designed typologies demonstrating the range of the interface: one discipline using tools and perspective of another discipline to answer complex questions to disciplines integrating knowledge from various fields to answer similar questions. Interdisciplinary and interprofessional pedagogy continues to grow such that, now annually, interdisciplinary teaching and learning conference is hosted by the Michigan State University (http://lbc.msu.edu/CITL/bibliography.cfm).

Systems framework for structuring interdisciplinary programs
A systems perspective is a useful framework for planning and organizing an interprofessional educational model, where concepts related to subsystem, components, homeostasis and inertia can help explain current educational models within a discipline or profession, and also guide the development of interprofessional educational models (Holley, 2009). Higher education needs to capture the interdependence between interprofessional education and interprofessional practice (e.g. D'Amour and Oandasan, 2005; Frenk *et al.*, 2010; World Health Organization, 2010). It needs to assist students with connecting and synthesizing their knowledge and skills with those of students from other relevant fields and professions. For example, professionals and practitioners from health care, social work, criminal justice and elementary/secondary schools interact and work on interprofessional teams addressing cases involving children in abusive situations. They all need to be trained in systems thinking, practice their respective skill set in an interprofessional context, and understand how each of the

mentioned practitioners contributes to completing comprehensive assessment of and intervention with a child, their family and their larger context.

Interdependence and connectedness is quintessential to systems' thinking. Making "connections" (Cronon, 1998) is also an integral part of professional education that may not occur automatically unless a concerted and systematic effort is made by educators to develop a learning experience "to enable students make connections across the curriculum" (Smith and Morgaine, 2004, p. 271). If these connections are appropriately established, then when professionals from disparate fields integrate their knowledge, skills and observations, generally, they develop an enhanced understanding of the issue because their contributions complement each other (Briggs, 1999; Shor, 2010). Graduates of professional education programs receive competency-based education specific to their fields; however, through generative and transformative learning opportunities in an interprofessional educational environment they can develop and refine interprofessional collaborative competencies and create sustainable social change.

Generative and transformative learning
Interprofessional teamwork and competencies can best be developed and nurtured through generative and transformative learning opportunities. London *et al.* (2012; Sessa and London, 2006) distinguished between adapative, generative and transformational processes and learning. Adaptive learning is "reacting almost automatically to stimuli to make changes in process and outcome as a coping mechanism" (Sessa and London, 2011, p. 149). This parallels concepts of "single loop learning" (Argyris and Schön, 1996) and "exploitive learning" (Vera and Crossan, 2004). It builds on prior perspectives. Generative learning is "learning pro-actively and intentionally and applying new skills, knowledge, behaviors, and interaction patterns […]" (Sessa *et al.*, 2011, p. 149). It is similar to "double-loop learning" (Argyris and Schön, 1996), and "explorative learning" (Vera and Crossan, 2004). It involves exploring alternative methods, asking questions, challenging assumptions, seeking different perspectives, evaluating alternatives and reflecting on their actions (Van der Vegt and Bunderson, 2005). Transformative learning is "re-shaping or altering the team's purpose, goals, structure, or processes" (London and Sessa, p. 149) and requires experiencing disorientation and reorientation for an entirely new direction of growth and development. Transformational learning entails interaction with colleagues/peers/classmates wherein individual assumptions, beliefs and perspectives are challenged and a person may arrive at new perspectives in light of these exchanges and actions (Boyd and Myers, 1988; Merizow, 2000). By reflecting on different perspectives of interdisciplinary team members, and utilizing emotional, intuitive and rational reasoning processes to modify their assumptions and expectations, team members are able to work effectively with different professional player. Adaptive learning occurs in the process of finding solutions when there is a clear right answer, as there would be in solving a puzzle. Generative and transformative learning occur in the process of solving problems that have no right answer. Innovative solutions to endemic human and environmental challenges require generative and sometimes transformational learning and problem solving. Conditions that promote generative and transformational learning include pressures and opportunities in the environment, individuals' readiness to learn, openness to new ideas, ability to understand others' views and perspectives and acting on insights gained to internalize the transformation (Freire, 1970; Merizow, 2000).

Challenges

The distinguishing feature of interdisciplinary education is its ability to integrate "disciplinary perspectives into a larger, more holistic perspective" (Newell, 1994, p. 213). According to Smith and Morgaine, "[i]t is generally recognized that achieving a fully realized interdisciplinarity is difficult at best" (2004, p, 267). Besides, without formal experience in interdisciplinary approaches, can faculty members deliver such a curriculum, especially, since the literature is imbued with challenges related to planning and implementing interdisciplinary education (Wieseman and Moscovici, 2003)? Developing an interdisciplinary or interprofessional curriculum requires faculty to move beyond their own comfort zones of teaching, take risks, adopt new paradigms for pedagogy delivery, resolve their personal dilemmas, negotiate new roles with faculty members from participating disciplines and overcome their inertia in order to successfully collaborate in planning and delivering an interprofessional curriculum.

At the very minimum, developing an integrated educational model is extensively time consuming (Smith and Morgaine, 2004). Long (2001, cited in Shor, 2010) and Pecukonis *et al.* (2008) noted that despite the extensive literature on the merits of interprofessional practice and education, these efforts are often hard to implement and maintain. Pecukonis *et al.* noted that there is a "reluctance to operationalize and institutionalize interprofessional education" (p. 418). Cooper *et al.* (2001) identified barriers, such as inadequate time and effort for planning an interprofessional educational session, lack of faculty interest and lack of training available to faculty to think and teach in an interprofessional fashion, in institutions of higher learning. Several studies too have documented the challenges (see the list below) experienced by students and professionals working on interprofessional teams (Applegate *et al.*, 2009; Shor, 2010; Wieseman and Moscovici, 2003). Training experiences help students recognize these challenges and consider ways to face and overcome them in their professional careers:

- difficulty learning the terms and methods used by individuals from different professions and disciplines;
- difficulty understanding the underlying assumptions of a discipline if they were made explicit at the outset of the interdisciplinary team development;
- students' own level of maturity and experience influenced their comfort with collaborating on an interdisciplinary team;
- logistical barriers in scheduling courses that can accommodate the needs and schedules of students from various disciplines and professional programs;
- extensive use of professional jargons that inhibit interprofessional communication;
- in graduate programs, building on students' undergraduate experiences, which combine general education, major courses, and often community-based service learning;
- lack of knowledge of skills and competencies of partnering professionals on a team;
- stereotypes that one profession has about other professions on a team; unwillingness to collaborate; and
- insufficient time to plan interprofessional pedagogy.

Illustrations
Notwithstanding the aforementioned challenges, specific illustrations of interprofessional educational models in education and health care fields include the PACT program at the University of Wisconsin, Madison (Bubenzer and Westphal-Johnson, 2012), the University of Toronto's (2009) Interprofessional Educational Center and the Western University of Health Science's (2012) commitment to health professionals acquiring interprofessional competencies.

The Accreditation Board for Engineering and Technology (ABET) recognizes the widespread nature of interdisciplinary research and practice, and strongly encourages engineering students to learn to function within multidisciplinary teams. Engineering faculty are continuing to develop bridges between disciplines through interactive exercises and learning activities (Borrego *et al.*, 2007). McNair *et al.* (2011) explored how students and faculty develop interdisciplinary identities and how self-managed work teams can be used as pedagogical tools to encourage interdisciplinary mindset. Their case highlighted the value of faculty modeling interdisciplinary researcher roles to students and encouraging them to appreciate different disciplinary perspectives. Interdisciplinary educational models cut across structural boundaries within academia, showing how overlapping affinity and institutional identities are emerging from such teaming.

The US National Science Foundation (NSF) Integrative Graduate Education and Research Traineeship (IGERT) program was established to provide undergraduate and graduate students in science and engineering with interdisciplinary background that draws, and builds, on their disciplinary knowledge and personal skills to promote innovations through hands-on experiences. Additionally, the program provides funding for new models for graduate education and training that encourages collaborative research, circumscribing traditional disciplinary boundaries, benefitting society. One example of a program funded by IGERT is entitled, "Big data social science: an integrative educational research program in social data analysis," at Pennsylvania State University (http://bdss.psu.edu/). The project encompasses a new curriculum, training in advanced technologies of data science and analytics, a series of research rotations in both academic and nonacademic settings and an event in which teams compete for innovate solutions to real social data analytics problems, such as crisis maps that use information communications technologies to forecast and prepare for conflicts and natural disasters. Fundamentally, such programs aim "[…] to facilitate diversity in student participation and preparation, and to contribute to a world-class, broadly inclusive, and globally engaged science and engineering workforce" (www.nsf.gov/funding/pgm_summ.jsp?pims_id = 12759).

Graduate programs in the sciences and health care can build interdisciplinary interfaces. For instance, the University of South Florida's Program in Biotechnology "[…] represents a multi-college partnership and a truly interdisciplinary collaboration. Participating colleges include the College of Medicine, the College of Engineering, the College of Public Health, the College of Arts And Sciences and the College of Business Administration. The program is designed to meet the increasing demand for trained people in this exploding area, which crosses the traditional fields of biological, chemical, engineering, health and computer sciences" (http://health.usf.edu/medicine/molecularmedicine/MastersProgram.htm). Another example is a dual Master's Degree in Biotechnology and Entrepreneurship. The program "[…] combines scientic insight and innovation with a toolkit for management and leadership. The combination allows students to understand the scientic process and its challenges

and at the same time to obtain the training that will enable them to facilitate the optimal translation of data from mind to market" (University of South Florida, Dual Degree Master's Program, Biotechnology and Entrepreneurship; http://gradaffairs.health.usf.edu/pdf/2%20Biotech%20&%20Entrepre%2010-11.pdf).

Principles and guidelines for interprofessional education and training

Social change strategies, interprofessional competencies and interprofessional education are integrally related, as depicted in Figure 1. In order to lead or participate in the change strategies, collaboration, negotiation, understanding different perspectives and values are illustrations of necessary competencies. Interprofessional education that employs a systems' perspective and promotes generative and transformational learning will be well suited for developing the mentioned competencies. The arrows in Figure 1 go both ways, because of the reciprocal and iterative relationship between the three.

In the list below, we propose guidelines for designing interprofessional education. They suggest focusing on contextually based innovations, valuing and respecting paradigms and perspectives of diverse professionals who can impact a situation, and purposefully collaborating with educators from different professional programs to design interprofessional pedagogical models. Faculty members teaching in professional programs can provide their students with structured opportunities for understanding disparate worldviews of related professions (e.g. medical, nursing, healthcare administration and social work) and for integrating knowledge of these related professionals in decision making. In particular, students need to recognize the assumptions that underlie their practices, how their profession contributes to solving complex issues, possible conflicts with other professions' approaches to practice and solutions and opportunities for disciplinary synthesis for improved outcomes (Newell, 1992). Through such structured opportunities, students can transform their own learning and move beyond sequential learning to learning alongside students from different professional fields and disciplines (Smith and Morgaine, 2004):

- enable respect for all participating professionals and disciplines (Wieseman and Moscovici, 2003);

- assist student to learn with, from and about each other's professional background (Jacobsen *et al.*, 2009);

- employ interprofessional didactic teaching and experiential learning experience for students (Young *et al.*, 2011);
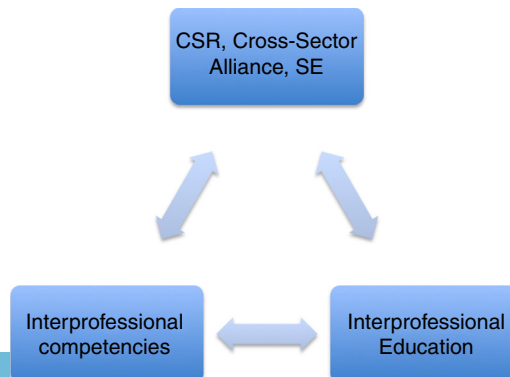
Figure 1.
Relationship between social change strategies, interprofessional competencies and interprofessional education

- be adaptable so that the educational model can be responsive to the local/
  community based needs and culture;

- generate contextual solutions for meeting complex needs of a community
  (Lawson, 2009);

- develop interpersonal communication and trust among participating faculty
  members who demonstrate these skills and qualities to students (Wieseman and
  Moscovici, 2003);

- allow for purposeful and collaborative team teaching, open communication and
  common pedagogical philosophy among faculty members (Stewart and Perry,
  2005); and

- enable generative and transformational learning (Sessa and London, 2006).

These guidelines can be implemented in ways that incorporate systems' thinking that promotes generative and transformational learning. For instance, an interdisciplinary capstone course and an interprofessional internship can "provide students with a longer period of time to understand, integrate, and master professional [and interprofessional] concepts and skills and integrate them into their [own professional paradigm]" (Smith and Morgaine, 2004, p. 268). Faculty and students can work together to integrate disparate disciplinary knowledge and skills through academic course work and practical training/internships that involve direct application in the community (Applegate *et al.*, 2009, p. 470; Pecukonis *et al.*, 2008). Experiential learning enables students to "translate classroom theory into practice" (Jones, 2009, p. 17). Moreover, if students can role play and practice working on an interprofessional topic in class before implementing the same in the community, such practices better equip students with interprofessional skills for addressing real-life problems (Applegate *et al.*, 2009). Interprofessional team-based experiential learning helps students develop and refine interprofessional communication skills – key to leading social change (Damron-Rodriguez and Corley, 2002; Holtzman *et al.*, 2012; Jacobsen *et al.*, 2009). Often, in working within interprofessional teams, practitioners compromise, understand the cultures of participating professions, rethink their own assumptions about their field and situations, and when appropriate, modify their beliefs and assumptions about professions, people and situations. These evolutions point towards transformative learning that can produce individual and social change (Pecukonis *et al.*, 2008). True interdisciplinarians are mindful of their own profession's limitations, recognize the contribution and expertise of other professions on the team, and commit a lot of time to this endeavor while taking risks and apologizing for their mistakes (Koch *et al.*, 2009).

Capstone courses and internships are the norm in most professional programs (e.g. nursing, education, management, engineering, pharmacy, social work, etc.). These courses are generally taught during the final year of professional training where they could be structured on the guidelines. Ideally, an interprofessional capstone course should incorporate the following elements:

- interprofessional teaching by faculty members from several professional fields
  that can potentially address pre-identified real-life problem(s) in the community
  surrounding the higher education institution;

- incorporation of specific common readings that enhances students'
  understanding of different professional values, best practices and core skill set;

- opportunities for students from the different professional programs to share their competencies and knowledgebase, and how they plan to create change/address/solve endemic social, educational or environmental challenge; opportunities for students to compare and contrast their respective values and skill set and to challenge the assumptions and beliefs they may have held of other professions (transformative learning);

- readings and discussions related to interdisciplinary collaboration and the identified problem/issue that students and faculty members from participating professions wish to address; readings and discussions pertaining to cross-sector alliances, CSR and SE; and

- based on the readings and personal inclinations, groups of students select issues (from the list of real-life problems presented in the capstone course) that they feel passionate about and form interprofessional teams in the capstone course.

Additionally, a problem-based organic process can be employed in a capstone course (Smith and Morgaine, 2004). Problem-based means the issue is embedded in the community or an organization and serves as the topic for interdisciplinary team of faculty and students to address. Problem-based learning strategy allows students to actively learn concepts, apply theories and practices learned in classrooms, and refine their professional skills by engaging with issues at an experiential level (Razzak, 2012). Organic implies that the interested parties and stakeholders are invited to weigh in on the issue and guide the development of interdisciplinary modules within a capstone course (Smith and Morgaine, 2004).

Following the capstone course, during the subsequent semester, each interprofessional team of students may be placed in a for-profit/nonprofit/public organization under supervision of an interprofessional team of faculty members. Students witness the interprofessional team of faculty employ their interprofessional and profession-specific competencies in these organizations; students emulate the same under close supervision of the faculty mentors. The faculty and students employ a systems' perspective to understand the issue and to design sustainable, as well as, an innovative solution.

Different combinations of professional programs in interprofessional education can address different types of social/community issues in diverse contexts. For instance, nursing, physical therapy, physicians, social work, engineering and legal students could be placed in a healthcare organization where they develop cross-sector alliances with different organizations to address a chronic health issue. Another model could include a team from physical education, health care, consumer behavior, entrepreneurship, social work and health psychology focused on CSR initiative that promotes healthy lifestyles in communities and workplace. Education, social work, management and legal students could be placed in an educational institution or a community foundation involved in a SE venture to address student dropout issue. Management, law and social work students could be placed in a corporation engaged in a social responsibility initiative to address a locality-based social issue. Students and faculty from engineering, social work, economics and business can collaborate with local community residents for addressing endemic unemployment issues among the disenfranchised populations. Yet another model could include students and faculty from engineering, geosciences, agriculture, urban planning, public health, business, social work and public policy who collaborate with residents to design local policies that promote community gardens – as social entrepreneurial initiatives – for feeding

community residents and for trading. This is not meant to be an exhaustive list of potential interprofessional educational models; institutions of higher learning in different countries can utilize most of these models.

Process for interprofessional curriculum development
By modifying professional boundaries, pedagogy can be more responsive to the contextual realities of higher education institutions (Holley, 2009). After discussion, conceptualization and planning, faculty members would agree on the purpose, structure and outcomes of the interprofessional curriculum and experience for the students, before implementing the model (Holley, 2009). Formative evaluation should be built into the implementation of the aforementioned curriculum model to enable faculty members to modify elements along the way. National Implementation Research Network's implementation science model may be well suited for this effort (Fixsen *et al.*, 2005). Providing details from this model is beyond the scope of this article, however, suffice it to say that any new program requires at least two years of planning in order to create the necessary structures and processes (i.e. implementation drivers). Stages of implementation move from preliminary exploration, to installation of the idea, to partial implementation to full implementation. The three key drivers (Fixsen *et al.*, 2005) for successful implementation are: first, ensuring that the parties, players and professional involved in implementation have the necessary competencies; second, ensuring that the institution has the necessary structures, policies and procedures along with funding to launch the idea; and third, employing both technical and adaptive leaderships as the circumstances require. Faculty members, university administrators and community members can gradually install the drivers to progressively implement an interprofessional educational model that is responsive to the needs of the community, region or nation.

Conclusion
Notwithstanding the challenges of planning and implementing an interdisciplinary educational curriculum, educators must not lose sight of the fact that after all, they are "transformative intellectuals" (Giroux and Simon, 1989, p. 242). They are the ones who can teach that effective collaboration is possible with appropriately delineating goals, providing clear role expectation to members, ensuring flexible decision-making process, familiarizing oneself with diverse knowledgebase, valuing participating professions, acknowledging and legitimizing the roles of participating professionals, establishing open communication patterns, developing shared understanding of problems and regularly refining and modifying the team's approaches (Leipzig *et al.*, 2002; Shor, 2010). Normally, only after faculty members from different disciplines and professions have received the necessary pedagogical, technological and curricula tools and training should they proceed to plan and implement an interdisciplinary program or course (Stewart and Perry, 2005; Weld and Trainer, 2007). Moreover, institutions of higher learning must hire interdisciplinary faculty members and create a promotion and tenure structure that is supportive of such pedagogy and scholarship (Holley, 2009). In essence, the challenges should not discourage intellectual entrepreneurs from fulfilling their ethical obligation to society of graduating students who are well prepared to effectively address vexing and complex problems (Cherwitz, 2007).

"Interdisciplinary collaboration is a twenty-first century inevitability manifesting in occupation and education at nearly every level" (Weld and Trainer, 2007, p. 157). Increasingly, accrediting organizations (e.g. the teacher's association, rehabilitation

program's association and the nursing association) as well as the World Health Organization, the Interdisciplinary Professional Education Collaborative and the Association for the Advancement of Collegiate Business Schools, are emphasizing interprofessional education and experience as being integral to professional training (Brown, 2009; Koch *et al.*, 2009; Stewart and Perry, 2005). The level of integration that occurs in interprofessional and interdisciplinary programs and teams has the potential to influence the degree of sustainable long-term solutions for complex issues (Holley, 2009).

Pedagogical models that promote creativity, flexibility, generativity and transformation are necessary to function within emergent communities of the twenty-first century across the globe (Holley, 2009). Particularly, graduate students need to learn to step outside the perspectives and paradigms of their primary profession and engage with multiple perspectives in order to cultivate critical reflection and reflective judgments (Schneidar, 1997). It's only through well-structured educational models can students be provided opportunities to grasp multiple perspectives and employ intellectual pluralism necessary to address complex situations (Smith and Morgaine, 2004). Thus, the goal of higher education – especially of professional programs – should be to promote teamwork and collaboration among students across fields to assist them in their future professional and occupational lives (Hylin *et al.*, 2007).

Universities that promote interdisciplinary programs, centers and institutes counter the fragmentation that occurs with the monodisciplinary endeavors. Such universities also enable faculty members to engage in activities outside their disciplines and professions by focusing on blending and synthesizing diverse worldviews to enhance understanding and generate sustainable solutions (Holley, 2009; Smith and Morgaine, 2004). Graduates of such institutions can become leaders and active participants in cross-sector alliances, socially responsible corporate initiatives, and in socially entrepreneurial ventures.

Note

1. We use "interdisciplinary" and "interprofessional" synonymously in this paper.

References

Applegate, A.G., D'Onofrio, B.M. and Holtzworth-Munroe, A. (2009), "Training and transforming students through interdisciplinary education: the intersection of law and psychology", *Family Court Review*, Vol. 47 No. 3, pp. 468-484.

Aram, J.D. (2004), "Concepts of interdisciplinarity: configurations of knowledge and action", *Human Relations*, Vol. 57 No. 4, pp. 379-412.

Argyris, C. and Schön, D.A. (1996), *Organizational Learning 2: Theory, Method, and Practice*, Addison-Wesley, Reading, MA.

Belenky, M.F., Clinchy, B.M., Goldberger, N.R. and Tarule, J.M. (1986), *Women's Ways of Knowing: The Development of Self, Voice, and Mind*, Basic Books, New York, NY.

Borrego, M., Newswander, L. and McNair, L.D. (2007), "Special session – applying theories of interdisciplinary collaboration in research and teaching practice", *Frontiers in Education Conference – Global Engineering: Knowledge without Borders, Opportunities without Passports, FIE '07, 37th Annual, S2F-1-S2F-4, Milwaukee, WI, October 10-13.*

Boyd, R.D. and Myers, J.G. 1988, "Transformative education", *International Journal of Lifelong Education*, Vol. 7 No. 4, pp. 261-284.

Briggs, M.H. (1999), "Systems for collaboration: integrating multiple perspectives", *Child & Adolescent Psychiatric Clinic of North America*, Vol. 8 No. 2, pp. 365-377.

Brown, D.G. (2009), "An interdisciplinary collaboration in nursing education", *Teaching and Learning in Nursing*, Vol. 4 No. 2, pp. 52-55.

Bruder, M.B. (2000), "Family-centered early intervention: clarifying our values for the new millennium", *Topics in Early Childhood Special Education*, Vol. 20 No. 2, pp 105-116.

Bubenzer, B. and Westphal-Johnson, N. (2012), "Preparing graduate students for college teaching careers: the Preparing Accomplished College Teachers (PACT) program at the university of Wisconsin-Madison", *Summer Academe: A Journal of Higher Education*, Vol. 4 No. 1, pp. 39-49.

Burbank, P.M., Owens, N.J., Stoukides, J., Evans, E.B., Leinhaas, M.M. and Evans, J.M. (2002), "Developing an interdisciplinary geriatric curriculum: the perils and payoffs of collaboration", *Educational Gerontology*, Vol. 28 No. 6, pp. 451-472.

Case, B.A. (1994), *You're the Professor, What Next? Ideas and Resources for Preparing College Teachers*, Mathematical Association of America, Washington, DC.

Cherwitz, R. (2007), "What is IE? Intellectual entrepreneurship: a cross disciplinary consortium", available at: https://webspace.utexas.edu/cherwitz/www/ie/what.html (accessed January 2010).

Clark, P.G. (2002), "Values and voices in teaching gerontology and geriatrics case studies as stories", *The Gerontologist*, Vol. 42 No. 3, pp. 297-303.

Cooper, H., Carlisle, C., Gibbs, T. and Watkins, C. (2001), "Developing an evidence-base for interdisciplinary learning: a systematic review", *Journal of Advanced Nursing*, Vol. 35 No. 2, pp. 228-237.

Cronon, W. (1998), "Only connect: the goals of liberal education", *American Scholar*, Vol. 67 No. 4, pp. 78-80.

Dacin, P.A., Dacin, M.T. and Matear, M. (2010), "Social entrepreneurship: why we don't need a new theory and how we move forward from here", *Academy of Management Perspectives*, Vol. 24 No. 3, pp. 37-57.

D'Amour, D. and Oandasan, I. (2005), "Interprofessionality as the field of interprofessional practice and interprofessional education: An emerging concept", *Journal of Interprofessional Care*, Vol. 19 No S1, pp. 8-20.

Damron-Rodriguez, J.A. and Corley, C. (2002), "Social work education for interdisciplinary practice with older adults and their families", *Journal of Gerontological Social Work*, Vol. 39 Nos 1-2, pp. 37-55.

Davis, S. (2002), "Social entrepreneurship: towards an entrepreneurial culture for social and economic development", Ashoka: Innovators for the Public, available at: www.ashoka.org/files/yespaper.pdf (accessed January 2013).

Dees, J.G., Emerson, J. and Economy, P. (2001), *Enterprising Nonprofits: A Toolkit for Social Entrepreneurs*, John Wiley & Sons Inc, New York, NY.

DiLisi, G.A., Eppell, S.J. and Upton, J. (2006), "Hierarchical learning ensembles", *Journal of College Science Teaching*, Vol. 35 No. 5, pp. 21-25.

Dillon, P.M., Noble, K.A. and Kaplan, L. (2009), "Simulation as a means to foster collaborative interdisciplinary education", *Nursing Education Perspectives*, Vol. 30 No. 2, pp. 87-90.

Doris, J.M., Davis, E., Du Pont, C. and Holdaway, B. (2009), "Social work in dentistry: the CARES model for improving patient retention and access to care", *Dental Clinics of North America*, Vol. 53 No. 3, pp. 549-559.

(The) Economist (2006), "Survey: The rise of the social entrepreneur", *The Economist*, Vol. 378, February 25, p. 12.

Eddy, P.L. (2010), *Partnerships and Collaboration in Higher Education: AEHE*, Jossey-Bass, San Francisco, CA.

Fixsen, D.L., Naoom, S.F., Blase, K.A., Friedman, R.M. and Wallace, F. (2005), *Implementation Research: A Synthesis of the Literature*, The National Implementation Research Network, Louis de la Parte Florida Mental Health Institute, University of South Florida (FMHI Publication #231), Tampa, FL, available at: http://nirn.fpg.unc.edu/sites/nirn.fpg.unc.ed/files/resources/NIRN-MonographFull-01 2005.pdf.

Focht, W. and Abramson, C.I. (2009), "The case for interdisciplinary environmental education and research", *American Journal of Environmental Sciences*, Vol. 5 No. 2, p. 124.

Freire, P. (1970), *Pedagogy of the Oppressed*, The Seabury Press, New York, NY.

Frenk, J., Chen, L., Bhutta, Z.A., Cohen, J., Crisp, N., Evans, T., Fineberg, H., Garcia, P., Horton, R., Yang, K., Kelley, P., Kistnasamy, B., Meleis, A.I., Naylor, D., Pablos-Mendez, A., Reddy, S., Scrimshaw, S., Sepulveda, J., Serwadda, D. and Zurayk, H. (2010), "Health professionals for a new century: transforming education to strengthen health systems in an interdependent world", *The Lancet*, Vol. 376 No. 9756, pp. 1923-1958.

George, C.L. and Oriel, K.N. (2009), "Interdisciplinary learning experience: two years of experience with an interdisciplinary learning engagement for physical therapy and special education students", *Journal of allied health*, Vol. 38 No. 1, pp. 22E-28E.

Giroux, H.A. and Simon, R. (1989), "Popular culture and critical pedagogy: everyday life as a basis for curriculum knowledge", in Giroux, H.A. and McLaren, P.L. (Eds), *Critical Pedagogy, State, and the Cultural Struggle*, State University of New York Press, New York, NY, pp. 236-252.

Gray, M., Healy, K. and Crofts, P. (2003), "Social enterprise: is it the business of social work?", *Australian Social Work*, Vol. 56 No. 2, pp. 141-164.

Hall, D.T. (2002), *Careers in and Out of Organizations*, Sage, Thousand Oaks, CA.

Harding, R. (2007), "Understanding social entrepreneurship", *Industry & Higher Education*, Vol. 21 No. 1, pp. 73-84.

Heal, G. (2008), *When Principles Pay: Corporate Social Responsibility and the Bottom Line*, Columbia Business School Publishing, Chichester, NY.

Holley, K.A. (2009), "Special issue: understanding interdisciplinary challenges and opportunities in higher education", *ASHE Higher Education Report*, Vol. 35 No. 2, pp. 1-131.

Holtzman, E.G., Dukes, T. and Page, T. (2012), "Interdisciplinary school leadership development for pre-service graduate students", *International Journal of Teaching and Learning in Higher Education*, Vol. 24 No. 1, pp. 89-94.

Howard, E.P., Rickles, N.M., Nannini, A., Harvey, R., O'Neil-Pirozzi, T.M., Kirwin, J. and Lowe, S. (2009), "Establishing an interdisciplinary geriatric education center", *Journal of Allied Health*, Vol. 38 No. 4, pp. 125E-129E.

Hsu, C. (2005), "Entrepreneur for social change", US News and World Report No. 139(16), available at: www.usnews.com/usnews/news/articles/051031/31drayton.htm (accessed May 2011).

Hylin, U., Nyholm, H., Mattiasson, A.C. and Ponzer, S. (2007), "Interprofessional training in clinical practice on a training ward for health care students: a two-year follow-up", *Journal of Interprofessional Care*, Vol. 21 No. 3, pp. 277-288.

Interprofessional Education Collaborative Expert Panel (2011), *Core Competencies for Interprofessional Collaborative Practice: Report of an Expert Panel*, Interprofessional Education Collaborative, Washington, DC.

Jacobs, H.H. (Ed.), (1989), *Interdisciplinary Curriculum: Design and Implementation*, ASCD, Alexandria, VA.

Jacobs, J.A. and Frickel, S. (2009), "Interdisciplinarity: a critical assessment", *Annual Review of Sociology*, Vol. 35 No. 3, pp. 43-65.

Jacobsen, F., Fink, A.M., Marcussen, V., Larsen, K. and Hansen, T.B. (2009), "Interprofessional undergraduate clinical learning: results from a three year project in a Danish interprofessional training unit", *Journal of Interprofessional Care*, Vol. 23 No. 1, pp. 30-40.

Jones, B.D. (2009), "Motivating students to engage in learning: the music model of academic motivation", *International Journal of Teaching and Learning in Higher Education*, Vol. 21 No. 2, pp. 272-285.

Kington, J.W. (1995), *Agendas, Alternatives and Public Policies*, 2nd ed., Harper Collins, New York, NY.

Klein, J.T. and Newell, W. (1997), "Advancing interdisciplinary studies", in Gaff, J. and Ratcliff, J. et al. (Eds), *Handbook of the Undergraduate Curriculum*, Jossey-Bass, San Francisco, CA, pp. 393-394.

Koch, L., Gitchel, D. and Higgins, K. (2009), "Preparing students to be empathic interdisciplinary rehabilitation team members", *Rehabilitation Education*, Vol. 23 No. 2, pp. 119-126.

Kotler, P. and Lee, N. (2005), *Corporate Social Responsibility: Doing the Most Good for Your Company and your Cause*, John Wiley and Sons Inc, Hoboken, NJ.

Lattuca, L.R. (2001), *Creating Interdisciplinarity: Interdisciplinary Research and Teaching Among College and University Faculty*, Vanderbilt University Press, Nashville, TN.

Lawson, H. (2004), "The logic of collaboration in education and the human services", *The Journal of Interprofessional Care*, Vol. 18 No. 3, pp. 225-237.

Lawson, H. (2009), "A research and development framework for the school dropout problem", *Advances in School Mental Health Promotion*, Vol. 2 No. 1, pp. 56-67.

Lawson, H.A. (2010), "An appreciation and a selective enhancement of the developing model for university-assisted community schools", *University and Community Schools*, Vol. 8 Nos 1-2, pp. 5-20.

Leipzig, R., Hyer, K., Ek, K., Wallenstein, S., Venzina, M.L., Fairchild, S., Cassel, C.K. and Howe, J.L. (2002), "Attitude towards working on interdisciplinary health care teams: a comparison by discipline", *Journal of American Geriatric Society*, Vol. 50 No. 6, pp. 1141-1148.

Lennon-Dearing, R., Florence, J., Garrett, L., Click, I.A. and Abercrombie, S. (2008), "A rural community-based interdisciplinary curriculum: a social work perspective", *Social work in health care*, Vol. 47 No. 2, pp. 93-107.

London, M. (2012), "Lifelong learning", in Kozlowski, S. W. J. (Ed.), *The Oxford Handbook of Organizational Psychology, Vol. 2*, Oxford University Press, New York, NY, pp. 1199-1227.

London, M., Sobel-Lojeski, K. and Reilly, R. (2012), "Leading generative groups: a model of metacognition and balanced leadership", *Human Resource Development Review*, Vol. 11 No. 1, pp. 31-54.

McNair, L.D., Newswander, C., Boden, D. and Borrego, M. (2011), "Student and faculty interdisciplinary identities in self-managed teams", *Journal of Engineering Education*, Vol. 100 No. 2, pp. 374-396.

Mason, O. and Mitroff, I. (1981), *Challenging Strategic Planning Assumptions: Theory, Case and Techniques*, John Wiley and Sons, New York, NY.

Merizow, J. (2000), "Learning to think like an adult: core concepts of transformative theory", in Mezirow, J. and Associates (Eds), *Learning as Transformation: Critical Perspectives on a Theory in Progress*, Jossey-Bass, San Francisco, CA, pp. 3-33.

Mulvihill, P.R. (2010), "The visionary oasis: the long term challenge of interdisciplinary environmental studies", *Environments: a journal of interdisciplinary studies*, Vol. 37 No. 2, pp. 47-49.

National Academy of Science, National Academy of Engineering, Institute of Medicine (2004), *Facilitating Interdisciplinary Research*, The National Academic Press, Washington, DC.

Newell, W.H. (1992), "Academic disciplines and undergraduate interdisciplinary education: lessons from the school of interdisciplinary studies at Miami University, Ohio", *European Journal of Education*, Vol. 27 No. 3, pp. 211-221.

Newell, W.H. (1994), "Designing interdisciplinary courses", *New Direction for Teaching and Learning*, Vol. 58 No. 54, pp. 35-51.

Pecukonis, E., Doyle, O. and Leigh Bliss, D. (2008), "Reducing barriers to interprofessional training: promoting interprofessional cultural competence", *Journal of Interprofessional Care*, Vol. 22 No. 4, pp. 417-428.

Pomerantz, M. (2003), "The business of social entrepreneurship in a 'down economy'", *Business*, Vol. 25 No. 3, pp. 5-30.

Razzak, N.A. (2012), "Problem-based learning in the educational psychology classroom: Bahraini teacher candidates' experience", *International Journal of Teaching and Learning in Higher Education*, Vol. 24 No. 2, pp. 134-143.

Sagawa, S. and Segal, E. (2000), *Common Interest, Common Good: Creating Value Through Business and Social Sector Partnership*, Harvard Business School Press, Boston, MA.

Schneidar, C.G. (1997), "The arts and sciences major", in Gaff, J.G. and Radcliff, J.L. (Eds), *Handbook of the Undergraduate Curriculum: A Comprehensive Guide to Purposes, Structures, Practices, and Changes*, Jossey-Bass, San Francisco, CA, pp. 235-261.

Sessa, V. and London, M. (2006), *Continuous Learning: Directions for Individual and Organization Development*, Erlbaum, Mahwah, NJ.

Sessa, V.I., London, M., Pingor, C., Gullu, B. and Patel, J. (2011), "Adaptive, generative, and transformative learning in project teams", *Team Performance Management*, Vol. 17 Nos 3/4, pp. 146-167.

Shor, R. (2010), "Interdisciplinary collaboration between social workers and dieticians in nutrition education programs for children-at-risk", *Social Work in Health Care*, Vol. 49 No. 4, pp. 345-361.

Siegel, D. (2010), *Organizing for Social Partnership: Higher Education in Cross-Sector Collaboration*, Routledge, New York, NY.

Smith, C.L. and Morgaine, C. (2004), "Liberal studies and professional preparation: the evolution of the child and family studies program at Portland State University", *Child and Youth Care Forum*, Vol. 33 No. 4, pp. 257-274.

Stark, J.S. and Lowther, M.A. (1989), "Exploring common ground in liberal and professional education", in Armour, R.A. and Fuhrmann, B. (Eds), *Integrating Liberal Learning and Professional Education (New Directions for Teaching and Learning No. 40)*, Jossey-Bass, San Francisco, CA, pp. 7-20.

Stark, J.S. and Lattuca, L.R. (1997), *Shaping the College Curriculum: Academic Plans in Action*, Allyn & Bacon, Boston, MA.

Stewart, T. and Perry, B. (2005), "Interdisciplinary team teaching as a model for teacher development", *TESL-EJ*, Vol. 9 No. 2, pp. 1-17.

University of Toronto (2009), "University of Toronto interprofessional education curriculum/program", July 8, available at: www.rehab.utoronto.ca/PDF/IPE.pdf. (accessed March 2013).

Van der Vegt, G.S. and Bunderson, J.S. (2005), "Learning and performance in multidisciplinary teams: the importance of collective team identification", *Academy of Management Journal*, Vol. 48 No. 3, pp. 532-547.

Vega, G. and Kidwell, R.E. (2007), "Towards a typology of new venture creators: similarities and contrasts between business and social entrepreneurs", *New England Journal of Entrepreneurship*, Vol. 10 No. 2, pp. 15-28.

Vera, D. and Crossan, M. (2004), "Strategic leadership and organizational learning", *Academy of Management Review*, Vol. 29 No. 2, pp. 222-240.

Weld, J. and Trainer, J. (2007), "A faculty interdisciplinary institute as liberator from stifling disciplinary methodology", *College Teaching*, Vol. 55 No. 4, pp. 157-163.

Western University of Health Sciences (2012), "Interprofessional education", July 8, available at: www.westernu.edu/interprofessional-about. (accessed March 2013).

Wieseman, K.C. and Moscovici, H. (2003), "Stories from the field: challenge of science teacher education based on interdisciplinary approaches", *Journal of Science Teacher Education*, Vol. 14 No. 2, pp. 127-143.

World Health Organization (2010), *Framework for Action on Interprofessional Education & Collaborative Practice*, World Health Organization, Geneva, available at: http://whqlibdoc.who.int/hq/2010/WHO_HRH_HPN_10.3_eng.pdf (accessed April 2011).

Yadama, G.N. (2013), *Fires, Fuel, &The Fate of 3 Billion: The State of the Energy Impoverished*, Oxford University Press, New York, NY.

Yang, H.L. and Hsiao, S.L. (2009), "Mechanisms of developing innovative IT-enabled services: a case study of Taiwanese healthcare service", *Technovation*, Vol. 29 No. 5, pp. 327-337.

Young, H.M., Siegel, E.O., McCormick, W.C., Fulmer, T., Harootyan, L.K. and Dorr, D.A. (2011), "Interdisciplinary collaboration in geriatrics: advancing health for older adults", *Nursing Outlook*, Vol. 59 No. 4, pp. 243-251.

Further reading

Bloom, B.S., Engelhart, M.D., Furst, E.J. and Krathwohl, D. (1956), *Taxonomy of Educational Objectives Handbook 1: Cognitive Domain*, David McKay, New York, NY.

Borenstein, D. (2004), *How to Change the World: Social Entrepreneurs and the Power of New Ideas*, Oxford University Press, New York, NY.

Boyatzis, R. and McLeod, P. (2001), "Our educational bottom line: developing the whole person", *Journal of Management Education*, Vol. 25 No. 2, pp. 118-123.

Carroll, A.B. (1991), "The pyramid of corporate social responsibility: towards the moral management of organizational stakeholders", *Business Horizons*, Vol. 34 No. 4, pp. 39-49.

Casner-Lotto, J., Rosenblum, E. and Wright, M. (2009), "The ill-prepared US workforce: exploring the challenges of employer-provided workforce readiness training", Conference Board, available at: http://store.astd.org (accessed July 2012).

Collins, J. (2009), "How the mighty fall and why some companies never give in", *Business Week*, available at: www.amazon.com (accessed March 2013).

Dart, R. (2004), "The legitimacy of social enterprise", *Nonprofit Management and Leadership*, Vol. 14 No. 4, pp. 411-424.

Dees, J.G. (1998), "The meaning of social entrepreneurship", white paper, available at: www.fuqua.duke.edu/centers/case/documents/Dees_SEdef.pdf (accessed August 2007).

Fink, L. (2003), *Creating Significant Learning Experience: An Integrated Approach to Designing College Courses*, John Wiley, San Francisco, CA.

Gronlund, N.E. (1978), *Stating Objectives for Classroom Instruction*, 2nd ed., Macmillan Publishing, New York, NY.

Hildebrand, D.L. (2005), "Academics are intellectual entrepreneurs", *Peer Review*, Vol. 7 No. 3, pp. 30-31.

Jacob, B. (1996), *Service – Learning in Higher Education: Concepts and Practices*, Jossey-Bass, San Francisco, CA.

Jaskyte, K. (2004), "Transformational leadership, organizational culture, and innovativeness in nonprofit organizations", *Nonprofit Management & Leadership*, Vol. 15 No. 2, pp. 153-168.

Karoff, P. and Maddox, J. (2007), *The World we Want: New Dimensions in Philanthropy and Social Change*, AltaMira Press, New York, NY.

Leroux, K.M. (2005), "What drives nonprofit entrepreneurship? A look at budget trends of metro detroit social services agencies", *The American Review of Public Administration*, Vol. 35 No. 4, pp. 350-362.

Light, P.C. (2006), "Reshaping social entrepreneurship", *Stanford Social Innovation Review*, Vol. 4 No. 3, pp. 46-51.

Light, P.C. (2008), *The Search for Social Entrepreneurship*, Brookings Institute Press, Washington, DC.

Maikhuri, R.K., Nautiyal, S., Rao, K.S., Chandrasekhar, K., Gavali, R. and Saxena, K.G. (2000), "Analysis and resolution of protected area–people conflicts in Nanda Devi biosphere reserve, India", *Environmental Conservation*, Vol. 27 No. 1, pp. 43-53.

Matthew, M., Francois, P. and Miguel, R. (2012), "New perspectives on learning and innovation in cross-sector collaborations", *Journal of Business Research*, Vol. 65 No. 12, pp. 1700-1709.

Moore, C.H. (2007), "Forward", in Benioff, M. and Adler, C. (Eds), *The Business of Changing the World: Twenty Great Leaders on Strategic Corporate Philanthropy*, McGraw-Hill, New York, NY, p. xi.

Mort, G., Weerawardena, J. and Carnegie, K. (2003), "Social entrepreneurship: towards conceptualization", *International Journal of Nonprofit and Voluntary Sector Marketing*, Vol. 8 No. 1, pp. 76-88.

Nandan, M. and Scott, P. (2013), "Social entrepreneurship and social work: the need for a transdisciplinary educational model", *Administration in Social Work*, Vol. 37 No. 3, pp. 257-271, available at: www.tandfonline.com/doi/abs/10.1080/03643107.2012.684428

Nelson, D.L. and Quick, J.C. (2010), *Organizational Behavior*, South-Western Cengage Learning, Mason, OH, p. 148.

Perrini, F. (2006), "Social entrepreneurship domain: setting boundaries", in Perrini, F. (Ed.), *The New Social Entrepreneurship: What Awaits Social Entrepreneurial Ventures?*, Edward Elgar, Northampton, MA, pp. 1-25.

Porter, M. and Kramer, M. (2006), "The link between competitive advantage and corporate social responsibility", *Harvard Business Review*, Vol. 84 No. 12, pp. 78-92.

Prahalad, C.K. (2004), *The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits*, Wharton School Publishing, Upper Saddle River, NJ.

Thompson, A., Strickland, A. and Gamble, J. (2010), *Crafting and Executing Strategy*, 17th ed., McGraw-Hill, Erwin, New York, NY, pp. 310-321.

Thompson, J.L. (2002), "The world of the social entrepreneur", *The International Journal of Public Sector Management*, Vol. 15 Nos 4-5, pp. 412-431.

Tozzi, J. (2010), "How Goldman profits from nonprofits", *Business Week*, Vol. 64, available at: www.businessweek.com/stories/2010-02-03/how-goldman-profits-from-nonprofits (accessed July 2012).

Van Slambrouck, P. (1998), "A businesslike approach to helping the homeless", *Christian Science Monitor*, Vol. 90 No. 220, p. 1.

Wallace, L. (2010), "Multicultural critical theory. At B-school?", *The New York Times*, January 10 (New York ed.), p. BU1.

About the authors

Dr Monica Nandan is a Chair, Department of Social Work and Human Service at Kennesaw State University, Kennesaw, Georgia. She received her PhD, Masters in Social Work from Florida State University. She also received an MBA in Health Care from Augusta University and an MBA

in Finance and Bachelor in Commerce from the Institute of Management and Development Research, Poona University, India. Her research has focused on aging, service learning, health care, interdisciplinary pedagogy and teams and social entrepreneurs. Dr Monica Nandan is the corresponding author and can be contacted at: mnandan@kennesaw.edu

Dr Manuel London is a Dean, College of Business, State University of New York at Stony Brook, Stony Brook, New York. He received his PhD and MA in Industrial and Organizational Psychology from The Ohio State University, and his AB in philosophy and psychology from Case Western Reserve University. His research has focused on social entrepreneurship, feedback processes in management development and team learning.

www.mana